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NEWS OF HUNGARIAN SCIENTIFIC CONFERENCES

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NEWS OF HUNGARIAN SCIENTIFIC CONFERENCES

/Following are the translations of two articles concerning conferences in Hungary of physicists and of the Optical and Cinematechnical Society published in Fizikai Szemle (Physics Review, Vol X, No 12, Budapest, 1960, pages 376-378 and 379 respectively./

TABLE OF CONTENTS

SEVENTH ANNUAL HUNGARIAN CONFERENCE OF PHYSICISTS

/Following is the translation of an unsigned article in Fizikai Szemle (Physics Review), Vol X, No 12, Budapest, 1960, pages 376-378./

The President of the Society, Mr. Zoltan Gyulai, opened our annual conference on 22 August of this year. Present were representatives of the city of Miskolc and the Technical University of Heavy Industry, acting as hosts to the conference. Mr. Lajos Janossy greeted the participants in the name of the Hungarian Academy of Sciences.

The nature of the lectures given at this conference deviated from the usual pattern of the earlier years. In 1951, at Pecs, it was noted as a significant result that the three-day conference could be filled with reports on the individual research projects of the Hungarian physicists. Now we have reached the point where reviewing our broadening domestic achievements practically exceeds the time limits of the conference. Due to the manifold specialization, reviewing those became part of trade publications, institutional seminars and society colloquies. Therefore, the President of our Society decided to include relatively few lectures in the program this year and these are to give account of up-to-date and important problems of physics, which also pertain to domestic scientific interest and results.

Hence, the lecturers had more time to present the problems in a broader and deeper way. Most of the lecturers succeeded in satisfying the requirements thus set for them: auditing their lectures was useful for physicists working in various fields.

Following we will briefly review in outline the lectures delivered. The text of some outstanding lectures will be published in detail articles in our publication.

Antal Somogyi: "Results of the International Geophysical Year in the Field of Cosmic Radiation."

Examination methods of primary radiation: balloons, rockets, artificial moons and space rockets. Local consistence of primary radiation, origin and structure of the Van Allen zones. Time variant changes of primary radiation. The examination of the secondary radiation on high mountains, at ocean level, underground. The role of individual components: meteorological effects, geomagnetic effects. Measurement of the geomagnetic equator and the cosmic radiation equator. Polar effects. Periodic

changes. Significance of underground measurements. Detailed account of underground measurements performed in Hungary. The present status of the concept of the origin of cosmic radiation. Upon request, Mr. Endre Florian discussed the lecture.

Gyorgy Barta: "Results of the International Geophysical Year in the Field of Earth Magnetism."

The start of international cooperation, development of present organizations. Earlier geophysical collaboration, results of the so-called polar years. Refinement of developed concepts on the basis of the observations of the Geophysical Year, Ferraro-Chapman theory, development of the theory of high-frequency pulsation, closer aquaintance with the properties of the high atmosphere, discovery of the Van Allen zone. New measurement of the earth is magnetism. Deficiencies in present-day measurements, their improvement by employing new aerial and boat magnetometers, more accurate knowledge of the geometrical structure of the magnetic field. The excentric construction of the magnetic field. The concept of the centric and excentric dipoles. The magnetic centennial periodicity as the movement of the excentric dipole. Regularities of the change: turning of the change-vectors around Pakistan, 50-year period in the centennial change. Similar period may be recognized in the angular velocity of the earth. This suggests slow displacement of big masses. The assumable relation between the mass movement and the fluctuation of both the ocean level and the height of the pole. Inside structure of the earth. The assumable excentricity of the inner nucleus of the earth and its effedt on the level surface or the shape of the earth. The assumable relation between the three axis-likeness of the earth and the excentricity of both the magnetic field and the nucleus. Centennial change in the shape and gravitational field of the earth.

Gyorgy Marx: "On the Nature of the Interactions Between Elementary Particles."

Both long-known interactions of atomic physics, electricity and nuclear force, may be characterized with a dimensionless constant, thus they are independent of the choice of system of units. The most recently discovered "weak" interactions, among them the B decay, appear to be exceptions. There is a basic problem whether the interactions of the elementary particles really give preference to an elementary length. This closely relates to the origin of the mass of the elementary particles, the validity limitations of the quantum theory and the properties of "weak" interactions shown for big energies. In connection with the latter the lecturer examined the possibilities of experimental determination.

Bozoki, Domokos, Gombosi, Fenyves, Gemesy, Sandor, Sebestyen, Suranyi, Telbisz: "Examination of Nuclear Interactions Between High-Energy Accelerated Particles."

Review on the collaboration with the United Nuclear Research Institute of Dubna in the photoemulsion and bubble chamber examination of the nuclear interactions between high-energy accelerated particles. The exam-

ination of the interactions between 9 GeV protons and 7.3 GeV π-mezons in photoemulsion and determination of the angle and energy distribution of the particles originated in the collision. Bubble chamber examination of elastic scattering of 6.8 GeV π-mezons on protons and the examination of the proton structure with respect to nuclear interactions.

Otto Haiman: "Transient Effects in Gas Discharges."

The occurance of transient effects in gas discharge phenomena being important from theoretical or practical point of view. The stable forms of gas discharges, the equilibrium of particular processes. Elementary processes originating and determining transient effects. Adequate experimental methods for examining transient effects in gas discharge. Examinations performed on some specific effects.

Janos Szabo: "Propagation of Waves in Plasma."

In frictionless liquid and forceless field only longitudinal soundwaves can be propagated. As a result of interaction between electromagnetic and hydrodynamic processes, the properties of the waves being propagated in plasma are usually different from the characteristics of both hydrodynamic and electromagnetic waves. These waves, the role of which was first discovered in connection with astrophysics, also have an important role in controllable thermonuclear reactors, according to recent research. There is a specific relation between small amplitude magnetohydrodynamic and hydrodynamic waves: in hydrodynamics and magnetohydrodynamics the small amplitude waves are similarly related with "weak interruption surfaces" and the characteristics of the motion equations.

Lajos Pocs: "Nuclear Reactions in Stars."

Nuclear reactions bear great significance for the whole life of the stars: nuclear reactions generate the energy irradiated by the stars, transform hydrogen to heavier elements, and finally the lack or influence of some nuclear reactions is responsible for every change in the condition of the stars. Thus: for developing into "red giant" and also for the so-called "supernova" explosion. In the course of this processes there is opportunity for building up all the chemical elements.

Laszlo Bozoky: "Methods and Problems of Contemporary Dosimetry."

The significance of dosimetry in the peaceful application of atomic energy. The concept and measurement of radiation dose under 3 MeV photoenergy. Conditions of equilibrium, boundary phenomena, air-equivalent materials. The iondose. The concept and measurement of the absorbed dose on basis of Bragg-Gray theory. The integral absorbed dose. The concept and role of the RBE-dose in dose measurements of mixed radiation. The measurement methods of doses. Interactions used for dose measurements of slow and fast neutrons. Unsolved problems. New aims of dosimetry. Upon request, Mr. Daniel Vodros discussed the lecture.

Pal Vittay: "Newer Means of Generating X-rays."

X-ray tubes with hot cathode. X-ray tube with line-focus. X-ray tube with double focuses. Low-penetrating tubes for therapeutic purposes. X-ray tube with heavy anode. X-ray tube with rotating anode. X-ray tube with cavity anode. X-ray tubes with special anode construction for diagnostic and therapeutic purposes. High voltage development of X-ray tubes. Rectifying tubes. Use of practicle accelerators for generating X-rays. Betatron, microtron. Question of covering beam sources. Safety problems. Radiation protection.

Istvan Kiss, Istvan Kosa Somogyi: "Organic Compounds as Reactor Moderators."

Some organic compounds proved to be neutron decelerating substances for atomic reactors. The use of these materials in power reactors also as cooling substance seems to be very advantageous. A summary was given in the literature of the complex compounds of aeromagnetic carbon hydrogen mixtures and organic beryllium which has been recommended for the above purpose. The organic reactor moderators and the water as a decelerating and cooling substance were compared. The possibility of improving the decelerating properties of these compounds by changing the natural isotope composition (ratio of deuterium to hydrogen) and the concept of radiation stability of the aeromatic carbon-hydrogens were examined.

Lenard Pal: "Magnetic Scattering of Neutrons."

A specific form of the interaction between neutron and a substance is the magnetic interaction with atomic momemtums. This magnetic interaction enables magnetic structure examinations to be performed by means of neutrons, to polarize the neutron beam, and to draw conclusions on the inner magnetic field structure from the depolarization resulted from the interaction between polarized neutrons and the magnetic materials. The lecture gave a summary picture of the magnetic examinations to be performed by means of neutrons and also gave an account of those individual research results which, by means of neutrons, were conducted in order to acquire better knowledge of the near saturation condition of ferromagnetic materials.

Gyula Enzsol, Istvan Hadusfalvi, Szilard Marko: "The Interaction of Electromagnetic Waves with Gyromagnetic (Ferrite) Materials."

The lecture discussed the theory of microwave ferrites (magnetic materials showing non-reciprocal effect). The propagation of electromagnetic waves in infinite ferrite substance and in wave-guides partially filled with ferrites was discussed. The lecture pointed out the partial applications of the phenomena (isolator, phasechanger, gyrator, circulator and regulator.) It also gave account of microwave ferrite isolators (one direction conducting elements), circulator and regulator developed in AKI. Finally, it outlined many problems to be solved by future physical research.

Janos Ero, Lajos Pics, Imre Szentpetery, Jozsef Zimany: "Examination of Polarization Phenomena in Nuclear Reactions."

It is known that in very high-energy (in the order of magnitude of 100 MeV), nuclear interactions polarization effects may be experienced due to spin-path interaction. Recently, significant polarization was also observed in small-energy nuclear reactions. As regards stripping reactions, the theoretical calculations are in good agreement with the experiments and, thus, the study of polarization makes it possible to further clarify the mechanism of the nuclear reactions. Mainly the polarization occuring in small energy reactions and its experimental examination were discussed in the lecture.

1960 OPTICAL CONFERENCE AT BUDAPEST

/Following is the translation of an unsigned article in Fizikai Szemle (Physics Review), Vol X, No 12, Budapest, 1960, Page 379./

The Hungarian Optical and Cinematechnical (Kinotechnical) Society, a member of the Association of the Hungarian Scientific Societies (M.T.E.SZ.) held its conference, at which participated international guests, 7-11 September. Several foreign physicists, including such outstanding representatives of the optical field as Professor Marechal from the Theoretical and Applied Optical Institute in Paris and coauthor of the chapter on optics in the latest edition of the Handbuch der Physik, participated in the conference with lectures. Other participants were Professors Abeles from the same Institute, Lau from Berlin, Ingarden from Wroclav, and many others.

On the Hungarian side, announcements of lectures were received from the Optical and Precision Mechanical Research Laboratory, from the Physical-Optical Research Laboratory of the Central Physical Research Institute, from the Technical Physical Research Institute of the Hungarian Academy of Sciences (MTA) and from the "Gamma" Optical Works.

The lectures dealt with the following main topics: Some of the lectures concerned theoretical optical problems, such as the so-called correlation properties of light waves, the properties of standing light waves, light diffraction, and the theory of the optical picture, specifically when the size of the illuminating source is finite. Other lectures dealt with the optical properties of thin layers, the properties of the microscopic picture when diverse illumination is used, optical apparatus, such as new-type microscopes, theodolites, etc., and various other practical problems.

Following is a brief review of some of the selected lectures of the conference, which are of interest to physicists.

In their lecture, "Correlation Properties of Coherent Beams," L. Janossy, Zs. Naray and P. Varga gave an account of an experiment in which they directed a beam divided by a semi-transparent mirror onto two separated electron multipliers and watched the coincidences between impulses gained by means of a coincidence circuit of 10-9 sec time constant from the multipliers. It is known that the atom radiates for a definite period of time only. During this period a so-called wave-group is originated. Light may be imagined in case of macroscopic light-intensities as a disorderly pile of such wave-groups. In opposition to present day

concepts, the authors assumed that different wave-groups mutually interfere and by doing so peaks appear in random distribution of the cover-curve of the light amplitudes (similarly to the amplitude modulated radio waves). At these spots the probability of occurance of the photo-electrons is higher and its results in coincidence. The results are in good agreement with the theory. The authors also analyzed foreign experiments so far performed and stated that they are not entirely unobjectionable from the statistical viewpoint.

The properties of the standing waves were discussed in the lecture of Tibor Matray and Edith Koczkas, "The Effect of the Absorbing Layer on the Intensity Distribution of the Diffracted Beam When Displayed in Wiener Interference Field." The authors intended to prove for a light beam leaving the field of standing waves, that a standing wave field exists in the beam, by placing a thin absorbing layer into the field of standing waves. It was expected that the absorption would be smaller at points of intersection than at swelling points, the effect of which would have been a periodic intensity change of the beam leaving the interference area. In spite of expectations the experiment showed negative results. This allowed the authors to draw the conclusion that the absorption is the same at intersections as at swelling points, i.e., the linear superposition is justified even in absorbing substances.

There is an important tendency in modern optical research, which, in opposition to the present theoretical concepts of always assuming point sources, aims at taking the dimension of the practically realizable light source into account. In this case the light radiated by the source is not entirely coherent, since the light radiated by the other points of the source. Messrs. Jozsef Bakos and Karoly Kantos in their lecture "Diffraction of Lights on a Slot When Extensive Light Source Is Used," showed how the size and location of the intensity maximums and minimums, characteristic of the diffraction pattern depend on the width of the light source. The result of the experiment agreed with the theory and furnished its first quantitative proof.

The lecture of Professor Marechal, "The Picture Creation in Microscope and Partial Coherence," was read by Professor Abeles, due to hindrance of the author. In optical systems the picture forming depends upon whether the object is illuminated by coherent, partially coherent or incoherent light, i.e., the light source is point-like, finite extensive or infinitely big. In the latter case the Fourier transform (See Note) of the intensity distribution for the pattern may be given in the following simple form:

$$1 = o \cdot d$$

where o is the Fourier transform of the intensity function for the object and d is that of the diffusion function for the optical system. This, as it was shown by the author, can not be expressed in such simple form for the case of partially coherent illumination generally occuring in practice, except when the contrast of the object is very small. With the microscope, however, this usually is the case and therefore the expression even for partial illumination is relatively simple.

(/Note:/ The Fourier series is expressed in respect to so called field frequencies /the dimension of a field frequency is 1 cm/).

The d function is also called contrast transmission function. Mr. Laszlo Varga, in his lecture "Geometrical Optical Examination of the Frequency Transmission of Optical Systems," discussed a method by means of which the transmission function can be determined for slot-errors also.

Mr. Ingarden gave, in a very interesting lecture, account of the problem of the so-called optimum optical system. One of the most important requirements set for optical systems is that the information content of a picture agree or just slightly disagree with the information content of the object. The author demonstrated that this was not possible independently from the object, since for different objects different optical systems would meet this requirement. At the same time he shows the connection between the indeterminacy relations existing in optics and those of quantum theory and information theory.

Mr. Kalman Bernolak compared various microscopical examination methods. He demonstrated that in case of different illumination information, different properties of the object can be gained, and for a given object a specific illumination method shall be used which may be a composition of various methods to get maximum information. In case of inadequate choice of information, the properties intended to be measured may not be gained at all or, if any gained, they will be incorrect.

Messrs. Gyula Benoze and Endre Hodi examined the light distribution of the microscopic picture of optical lattices by different illumination and examination methods.

A number of the lectures were concerned with the properties of semi-transparent layers and their manufacturing problems.

The conference also yielded valuable lectures concerning practical problems. We will not go into reviewing those.

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